- 1 1. An isolated DNA comprising:
- 2 (a) a nucleic acid sequence that encodes a polypeptide with the ability to co-
- 3 stimulate a T cell, wherein the nucleic acid sequence hybridizes under stringent conditions to
- 4 the complement of a sequence that encodes a polypeptide with an amino acid sequence with
- 5 SEQ ID NO:1 or SEQ ID NO:3; or

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- 6 (b) the complement of the nucleic acid sequence.
- 1 2. The DNA of claim 1, wherein the nucleic acid sequence encodes a
- 2 polypeptide comprising an amino acid sequence with SEQ ID NO:1.
- 1 3. The DNA of claim 1, wherein the nucleic acid sequence encodes a
- 2 polypeptide comprising an amino acid sequence with SEQ ID NO:3.
 - 4. The DNA of claim 1, wherein the nucleic acid sequence has a sequence of SEQ ID NO:2.
 - 5. The DNA of claim 1, wherein the nucleic acid sequence has a sequence of SEQ ID NO:4.
 - 6. An isolated polypeptide encoded by the DNA of claim 1.
 - 7. The isolated polypeptide of claim 6, wherein the polypeptide comprises an amino acid sequence of amino acid residue 23 to amino acid residue 290 of SEQ ID NO:1, or said amino acid sequence but differing solely by conservative substitutions.
 - 8. The isolated polypeptide of claim 6, wherein the polypeptide comprises an amino acid sequence of amino acid residue 23 to amino acid residue 290 of SEQ ID NO:3, or said amino acid sequence but differing solely by conservative substitutions.
 - 9. The isolated polypeptide of claim 6, wherein the polypeptide comprises an amino acid sequence of SEQ ID NO:1, or said amino acid sequence but differing solely by conservative substitutions.

- 1 10. The isolated polypeptide of claim 6, wherein the polypeptide comprises an amino acid sequence of SEQ ID NO:3, or said amino acid sequence but differing solely by conservative substitutions.
- 1 11. A vector comprising the DNA of claim 1.
- 1 12. The vector of claim 11, wherein the nucleic acid sequence is operably linked 2 to a regulatory element which allows expression of said nucleic acid sequence in a cell.
- 1 13. A cell comprising the vector of claim 11.

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- 1 14. A method of co-stimulating a T cell, the method comprising contacting the T cell with the polypeptide of claim 6.
 - 15. The method of claim 14, wherein the contacting comprises culturing the polypeptide with the T cell *in vitro*.
 - 16. The method of claim 14, wherein the T cell is in a mammal.
 - 17. The method of claim 16, wherein the contacting comprises administering the polypeptide to the mammal.
 - 18. The method of claim 16, wherein the contacting comprises administering a nucleic acid encoding the polypeptide to the mammal.
 - 19. The method of claim 16, comprising:
- 2 (a) providing a recombinant cell which is the progeny of a cell obtained from the 3 mammal and has been transfected or transformed *ex vivo* with a nucleic acid encoding the 4 polypeptide so that the cell expresses the polypeptide; and
 - (b) administering the cell to the mammal.
- 1 20. The method of claim 19, wherein the cell is an antigen presenting cell (APC) and the cell expresses the polypeptide on its surface.
- 1 21. The method of claim 20, wherein, prior to the administering, the APC is 2 pulsed with an antigen or an antigenic peptide.

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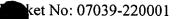
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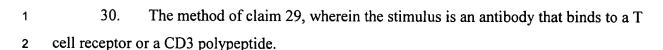
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- 1 22. The method of claim 16, wherein the mammal is suspected of having an 2 immunodeficiency disease.
- 1 23. The method of claim 16, wherein the mammal is suspected of having an inflammatory condition.
- 1 24. The method of claim 16, wherein the mammal is suspected of having an autoimmune disease.
- 1 25. A method of identifying a compound that inhibits an immune response, the method comprising:
 - (a) providing a test compound;
- 4 (b) culturing, together, the compound, the polypeptide of claim 6, a T cell, and a 5 T cell activating stimulus; and
 - (c) determining whether the test compound inhibits the response of the T cell to the stimulus, as an indication that the test compound inhibits an immune response.
 - 26. The method of claim 25, wherein the stimulus is an antibody that binds to a T cell receptor or a CD3 polypeptide.
 - 27. The method of claim 25, wherein the stimulus is an alloantigen or an antigenic peptide bound to a major histocompatibility complex (MHC) molecule on the surface of an antigen presenting cell (APC).
- The method of claim 27, wherein the APC is transfected or transformed with a nucleic acid encoding the polypeptide and the polypeptide is expressed on the surface of the APC.
- 1 29. A method of identifying a compound that enhances an immune response, the method comprising:
- 3 (a) providing a test compound;
- 4 (b) culturing, together, the compound, the polypeptide of claim 6, a T cell, and a 5 T cell activating stimulus; and
- 6 (c) determining whether the test compound enhances the response of the T cell to 7 the antigen, as an indication that the test compound enhances an immune response.





- 1 31. The method of claim 29, wherein the stimulus is an alloantigen or an antigenic 2 peptide bound to a MHC molecule on the surface of an APC.
- 32. 1 The method of claim 31, wherein the APC is transfected or transformed with a 2 nucleic acid encoding the polypeptide and the polypeptide is expressed on the surface of the APC. 3
- 1 33. An antibody that binds specifically to the polypeptide of claim 6.
- 34. 1 The antibody of claim 33, wherein the antibody is a monoclonal antibody.
- 1 35. The antibody of claim 33, wherein the antibody binds to the polypeptide with 2 SEQ ID NO:1.
 - 36. A cell comprising the vector of claim 12.

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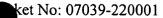
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- 37. A method of producing a polypeptide that co-stimulates a T cell, the method comprising culturing the cell of claim 36 and purifying the polypeptide from the culture.
- 38. A fusion protein comprising a first domain joined to at least one additional domain, wherein the first domain comprises a polypeptide of claim 6.
- 1 39. The fusion protein of claim 38, wherein the at least one additional domain 2 comprises the constant region of an immunoglobulin heavy chain or a fragment thereof.
- 40. 1 A nucleic acid molecule encoding the fusion protein of claim 39.
- 1 41. A vector comprising the nucleic acid molecule of claim 40.
- 42. 1 The vector of claim 41, wherein the nucleic acid molecule is operably linked 2 to a regulatory element which allows expression of the nucleic acid molecule in a cell.
- 43. A cell comprising the vector of claim 42. 1





- 1 44. A method of producing a fusion protein, the method comprising culturing the 2 cell of claim 43 and purifying the fusion protein from the culture.
 - 45. The method of claim 14, wherein, the T cell is a helper T cell.
- 1 46. The method of claim 45, wherein the helper T cell is a helper T cell that 2 provides helper activity for a B cell antibody-producing response.
- 1 47. The method of claim 45, wherein the B cell antibody response is an IgG2a antibody response.
- 1 48. The method of claim 14, wherein the co-stimulation causes an increase in the 2 level of CD40 ligand on the T cell surface.